

# Putin's War, A European tragedy



Andrea Uolmi

## & The strategic impact of Air Denial

ACdre. Prof. Dr. Frans Osinga

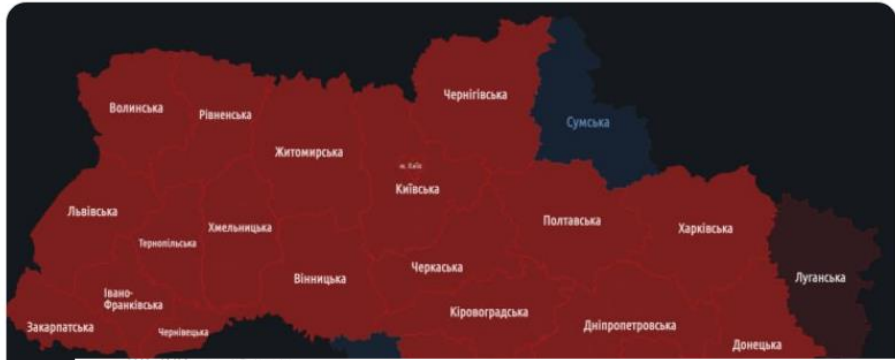


Air raid alert all over Ukraine.

Threats of a massive Russian rocket attack.

All in Ukraine advised to stay in shelters.

#RussiasATerroristState



### Russia 'fired over 50 missiles at Ukraine today'

Russia launched more than 50 missiles at **Ukraine** today, prime minister **Denys Shmyhal** has said, adding that most of those missiles were shot down.

Posting to Telegram, the Ukrainian PM said:

🚩 *Russia cannot accept failures and therefore continues to terrorise the (Ukrainian) population. Another attempt (on Friday) to destroy the Ukrainian energy system and deprive Ukrainians of light, heat, and water.*

Meanwhile, Ukraine's air force has said it shot down 61 of 71 Russian cruise missiles today. It said **Russia** had used eight Tu-95MS strategic bombers, and that they had fired X-101 and X-555 missiles from the Caspian Sea and the city of Volgodonsk in Russia.

A Telegram update from the air force said:

7:56 A

### Visit to London an 'important step' on road to fighter jets



Михайло Подоляк

@Podolyak\_M · Follow

RF has been striking at 🇺🇦 cities all night & morning. RF's intention is the same: mass destruction & killing. Enough talk & political hesitation. Only fast key decisions: long-range missiles, fighter jets, operational supplies logistics for 🇺🇦. Or else genocide can't be stopped.

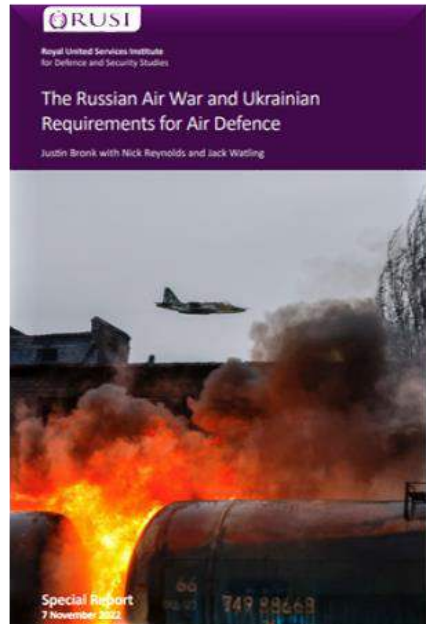
10:12 AM · Feb 10, 2023



## Opening shots: the strategic impact of Air Denial

“From early March, the VKS lost the ability to operate in Ukrainian-controlled airspace except at very low altitudes due to its inability to reliably suppress or destroy increasingly effective, well-dispersed and mobile Ukrainian surface-to-air missile (SAM) systems.”

“It is purely thanks to its failure to destroy Ukraine’s mobile SAM systems that Russia remains unable to effectively employ the potentially heavy and efficient aerial firepower of its fixed-wing bomber and multi-role fighter fleets to bombard Ukrainian strategic targets and frontline positions from medium altitude, as it did in Syria.”





**Russia's missile deployment in Kaliningrad ups the stakes for Nato**

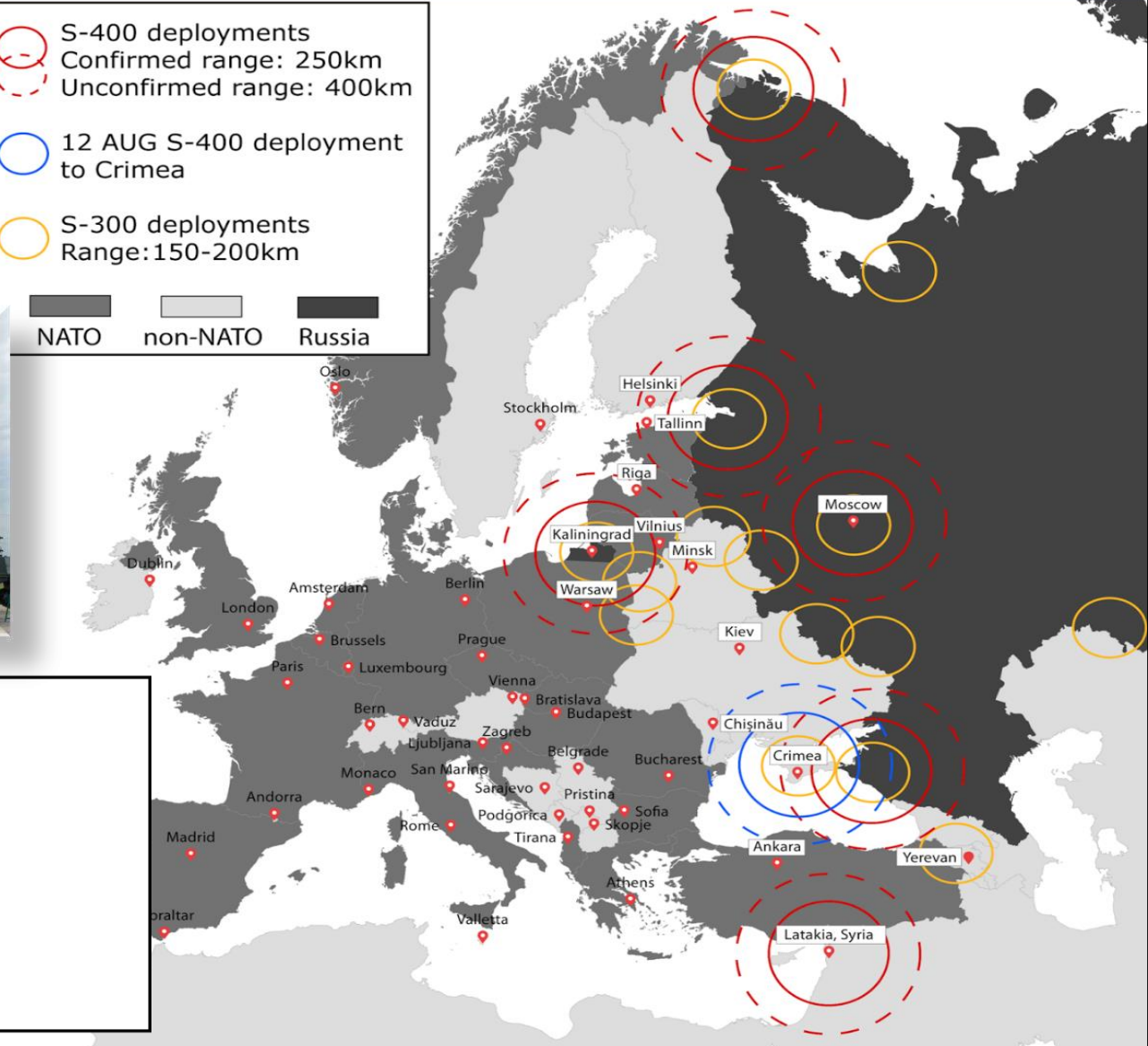
[Jonathan Marcus](#) Diplomatic correspondent  
9 October 2016



**ISW INSTITUTE FOR THE STUDY OF WAR**  
**Russian Anti-Access and Area Denial (A2AD) Range: August 2016**

- S-400 deployments  
Confirmed range: 250km  
Unconfirmed range: 400km
- 12 AUG S-400 deployment to Crimea
- S-300 deployments  
Range: 150-200km

NATO	non-NATO	Russia



**Military Capabilities**

**AFA 2015: Russia has closed air power gap with NATO, US warns**

Marina Malenic, Washington, DC - IHS Jane's  
Defence Weekly, 16 September 2015

# The challenges of A2AD: credible NATO deterrence posture?

- insufficient in-place ground forces: just tripwire
- Shortage of deep strike, SEAD, ISR, EW assets
- Air & missile defence scarce
- Lack of air superiority 4th Gen Fgts vis a vis Ru SAMs
- air support to ground problematic
- Questionable credibility of conventional deterrence & collective defence
- Default posture: Deterrence by punishment
- Vulnerable for Ru limited probe



## Ukr also got lucky; Ru Failed Initial Campaign

- 10 day Blitzkrieg stype campaign, no long term plans
- Flawed assumptions
  - Low troops density, 4 fronts
  - Units not prepared for intense combat ops
- Only short SA & OCA campaign
- Poor Joint Warfare Skills
  - RU uncoordinated infantry-armor ops results in many losses
  - RU uncoordinated airmobile ops into defended airfields
  - RU fails to gain air superiority
  - lack of air-land coordination
  - Mounting losses: 88 a/c & heli, 2000 casualties week 1

### Why the first few days of war in Ukraine went badly for Russia

Russia banked on Kyiv falling quickly. Here's why it hasn't.

By Zack Beauchamp | @zackbeauchamp | zack@vox.com | Feb 28, 2022, 6:50pm EST

EXCLUSIVE  
Battle for Kyiv: Ukrainian valor, Russian blunders combined to save the capital



# Russia's failed air war Feb-April

- OCA & DCA day 1-3
  - EW, Air Strikes, CM & BMs against Early Warning rdrs, fixed AD sites
  - limited OCA & SEAD ops after day 3, shift to ground support
  - Effective use of Ru CAPs with long range missiles, outclass old Ukr fighters
- Ukrainian Air Defence After day 1-3:
  - dispersal, air denial, combi GBAD & fighters
  - Jamming of Ru SAMs & comms
  - After March: increasing attrition on Ru fighters
  - Air denial effective: offers freedom of maneuver for Ukr army



# Russia's failed air war Feb-April

- Low effectiveness Ru air strikes
  - Single sorties/pairs
  - Low PGM stocks, use unguided ammo from med altitude
  - Target intel issues & Poor target acquisition & aiming tech
- CAS
  - lack of training
  - Air-land Comms & coordination problems
  - Risky Lo lvl tactics limit strike effectiveness
- Increasing # city bombing sorties
- Low sortie rates: initially 140, later 250-300/day



## Mar-Jun: Air Denial against Infra attacks

- Limited impact,
  - late in war
  - Low Ru stockpiles: intensity & frequency limited
  - Alternatives offer only limited accuracy
- Ukrainian AD increasingly effective
  - redeployed for AD against CMs around key cities/infra
  - March-April: **interception rates 20–30%, mid-June 50–60%.**
  - SA-11 'Buk' SAM systems allocated to frontline defence
  - long-range S-300 SAMs for city & infra defence
    - more capable against CMs & Tochka-U BMs
    - coverage over a wider area/less mobile than SA-11

### Missiles hit power stations in Lviv and along crucial railways in central and western Ukraine.

Altogether, six electrical substations were struck along the railways in central and western Ukraine, according to a top rail official. The rail system is the country's lifeline for humanitarian and military supplies.

### Russia intensifies attacks on railways, taking aim at Ukraine's lifeline to the outside world



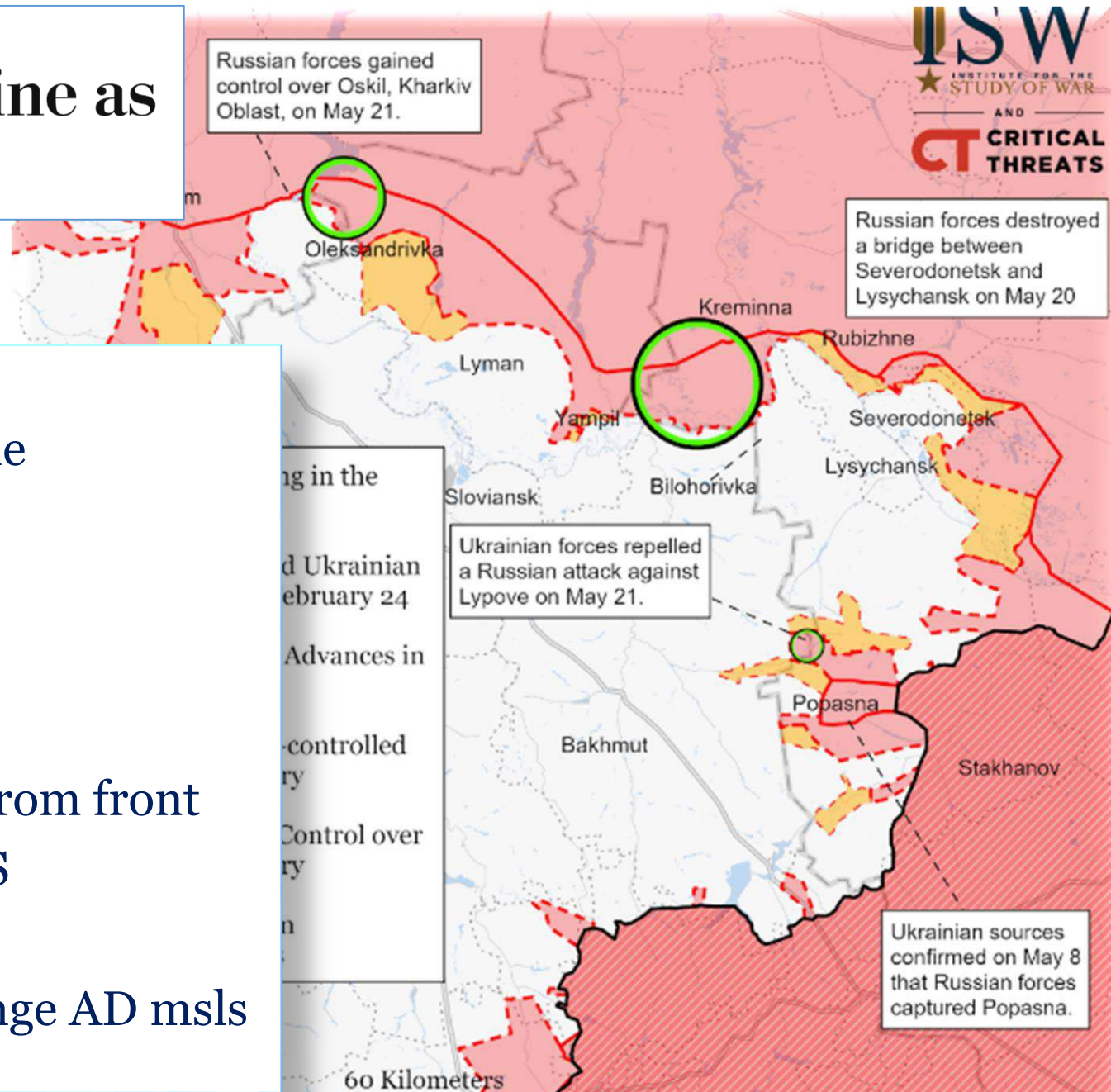
By Ivana Kottasová, Petro Zadorozhnyy and Lauren Said-Moorhouse, CNN  
Updated 11:04 AM EDT, Tue May 10, 2022



# Russia tries to rebound in Ukraine as prospects for victory fade

## Fight for air superiority

- More use of RU fighters & EW in SEAD role
- Forcing Ukr AD to switch on
- Strikers come in low in DEAD role
- Art'y against SAMs
- Ukr SAMs forced further from front
- Increasing # of Ru CAS, AI, but < 100km from front
- Ukr manpads result in lo effectiveness CAS
- Long range bombers with CMs
- High level Ru stand-off CAPs with long range AD msls



NATIONAL SECURITY

## U.S. dials up shipments of radar-hunting missiles for Ukraine

By Dan Lamothe

September 8, 2022 at 3:53 p.m. EDT

## Ukrainian Su-27s Are Now Using AGM-88 HARM Missiles Too

September 9, 2022 War in Ukraine, Weapons



STEFANO D'URSO



An Ukrainian Su-27 loaded with two AGM-88 HARM missiles. (Photo via Telegram)

The Ukrainian Air Force posted a video that appears to show a Ukrainian MiG-29 fighter armed with an AGM-88 HARM missile.

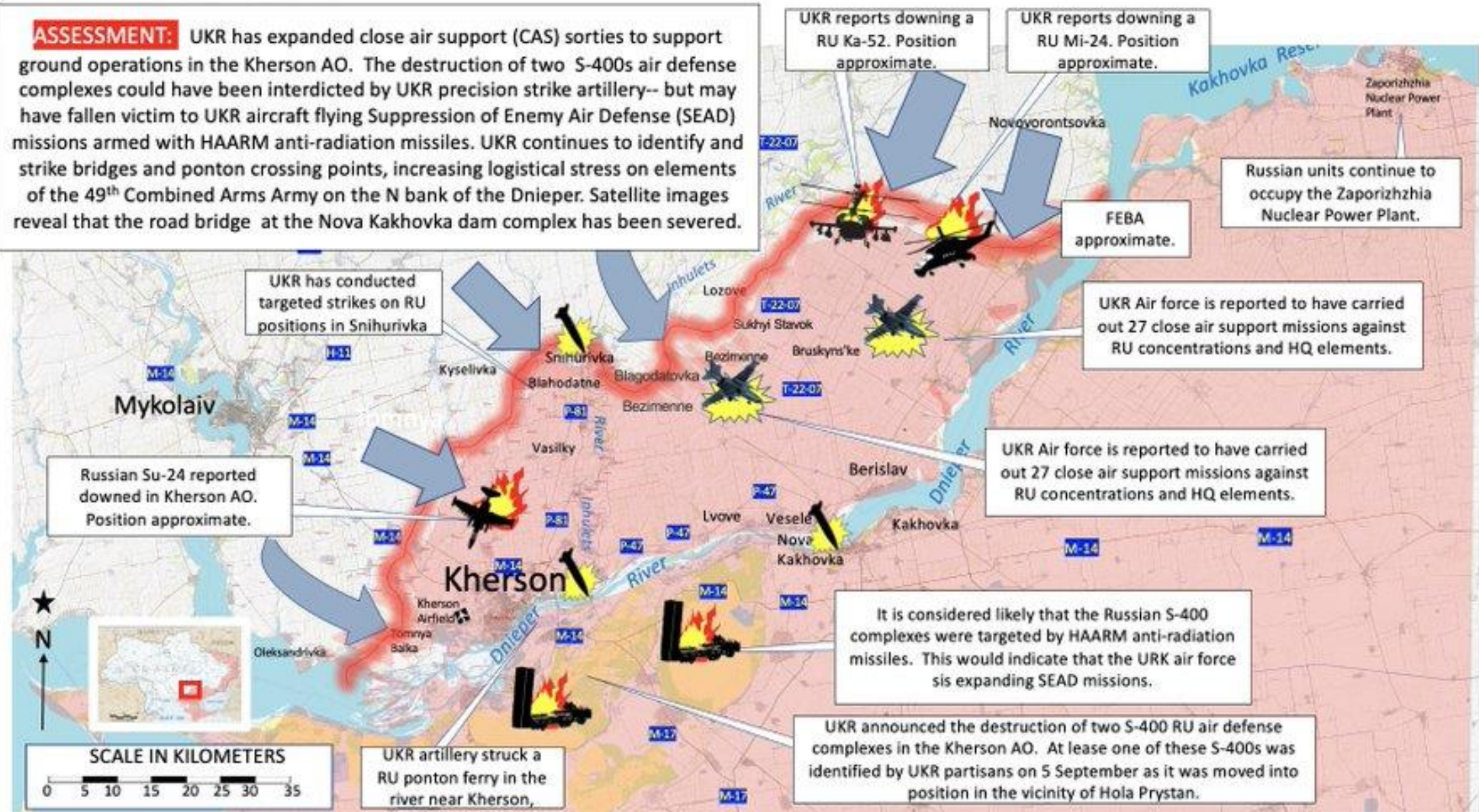
[facebook.com/kpszsuvideos/...](https://www.facebook.com/kpszsuvideos/...)



# KHERSON AXIS UKRAINE REPORTS THE DESTRUCTION OF TWO RUSSIAN S-400 AIR DEFENSE COMPLEXES, Mi-24 AND Ka-52s.

## 1245 UTC 8 SEPT S-400 AIR DEFENSE COMPLEXES, Mi-24 AND Ka-52s.

**ASSESSMENT:** UKR has expanded close air support (CAS) sorties to support ground operations in the Kherson AO. The destruction of two S-400s air defense complexes could have been interdicted by UKR precision strike artillery-- but may have fallen victim to UKR aircraft flying Suppression of Enemy Air Defense (SEAD) missions armed with HAARM anti-radiation missiles. UKR continues to identify and strike bridges and ponton crossing points, increasing logistical stress on elements of the 49<sup>th</sup> Combined Arms Army on the N bank of the Dnieper. Satellite images reveal that the road bridge at the Nova Kakhovka dam complex has been severed.



**Drones used by Russia**

**ORLAN-10**  
 Length: 6 ft 8 in  
 Max. speed: 93 mph  
 Approx. weight: 50 pounds  
 Range: About 88 miles

**SHAHED-136**  
 Length: 11 ft 8 in  
 Max. speed: 115 mph  
 Approx. weight: 440 pounds  
 Range: About 1,100-1,500 miles

The trainer-made Shahed-136 has a nose that contains an optical sensor, explosive warhead and optical sensor.

**Drones used by Ukraine**

**SWITCHBLADE 300**  
 Length: 20 inches  
 Max. speed: 100 mph  
 Approx. weight: 5.5 pounds  
 Range: About 6 miles

The Switchblade 300 is a small, autonomous, loitering munition that can be launched from a variety of launchers. It is designed to strike small groups of soldiers or armored vehicles. The drone also limits their range.

**BAYKATKAB TB3**  
 Length: 21 ft 4 in  
 Max. speed: 198 mph  
 Approx. weight: 1,513 pounds  
 Range: About 186 miles

The Bayraktar TB3, developed and manufactured by Baykar, a Turkish defense company, is the size of a small airplane and equipped with laser-guided missiles. The drone can both conduct reconnaissance and strike targets, making it a major part of Ukraine's arsenal against Russian forces.

**MATRICE 300 RTK**  
 Length: 33 inches  
 Max. speed: 21 mph  
 Approx. weight: 8 pounds  
 Range: About 9 miles

Independent commercial drones like the Matrice 300 RTK are gradually increasing their effectiveness. Many are powered by batteries or with onboard fuel.

**Drones used by both**

**MAVIC 3**  
 Length: 14 inches  
 Max. speed: 43 mph  
 Approx. weight: 3 pounds  
 Range: About 9 miles

6 feet

Source: Defense Forces, Environment, Dr. Baker, Tech



- Novel combinations with infantry & art'y ops
- Used in counter AD in EW mode combined with strike fighters
- High attrition number: 90%
- Average sortie # before KIA: 5-6
- Vulnerable for EW
- Radiolocation: Risks for operators

**Drones over Ukraine: Death in different sizes**

Iranian Shahed-136 drones can loiter over areas for hours until their cameras identify a target and the drone drops on it like a bomb. The Russians are using these weapons to devastating effect without risk to their troops.

**SHAHED-136 (IRAN)**  
 Length: 11 feet  
 Max. speed: 115 mph  
 Approx. weight: 440 pounds  
 Range: About 1,100-1,500 miles

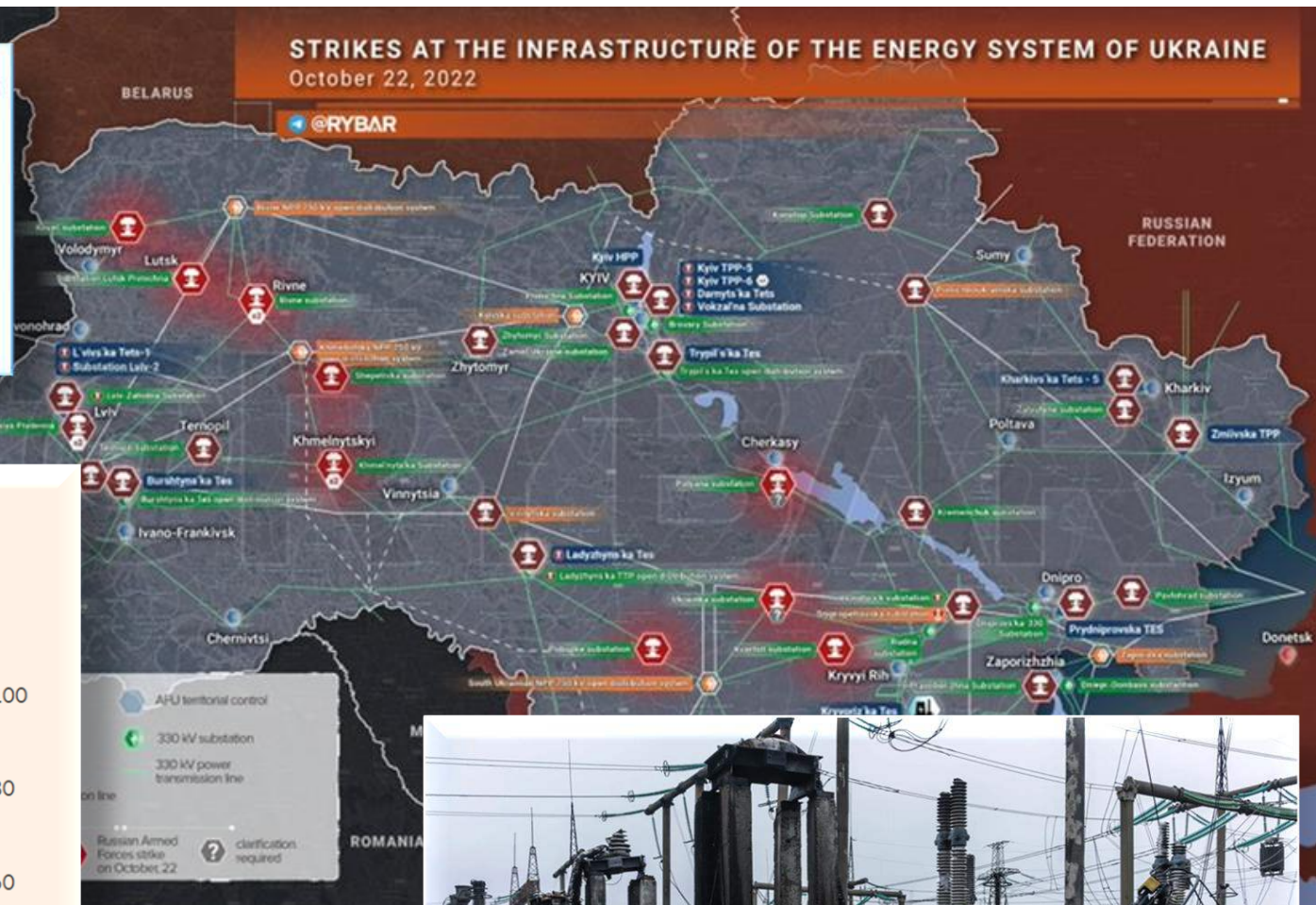
Nose contains explosive warhead as well as cameras

But the Iranian drones are bigger, noisier and reportedly easier to shoot down than the tiny Switchblade 300s the U.S. is supplying to Ukraine.

**SWITCHBLADE 300 (U.S.)**  
 Length: 20 inches  
 Max. speed: 100 mph  
 Approx. weight: 5.5 pounds  
 Range: About 6 miles

# For Ukraine, Keeping the Lights On Is One of the Biggest Battles

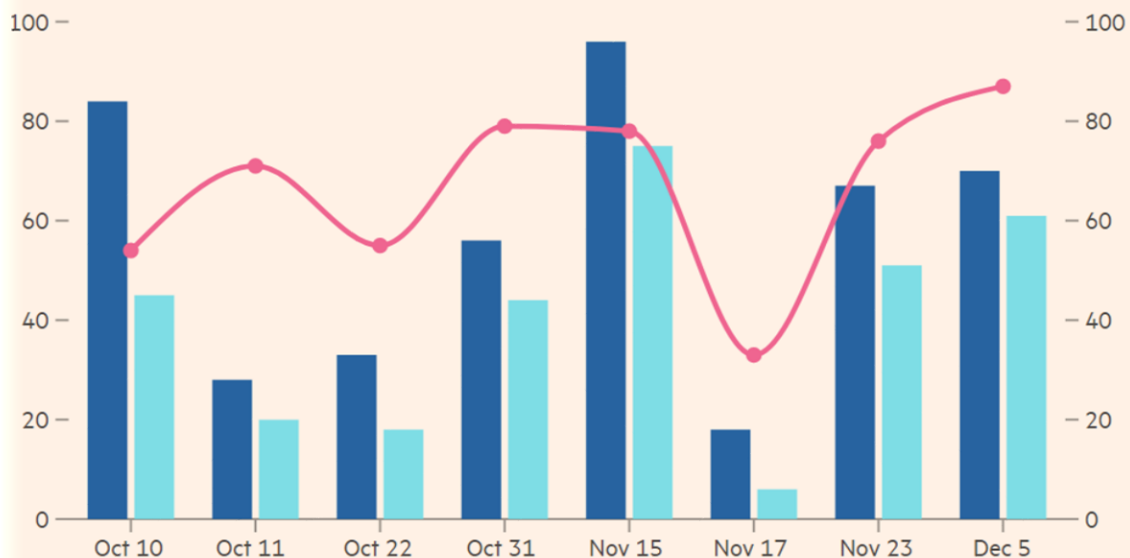
This week's missile assault by Russian forces has hit at least 15 energy facilities — some for the fifth or sixth time — forcing controlled blackouts in every part of the country.



## Ukraine's high interception rate

Recent Russian missile attacks

■ Number launched ■ Number intercepted ■ % intercepted



“We have no other choice but to switch to these types of weapons since the Soviet weapons of the [19]70s and [19]80s are both [ . . . ] obsolete and the enemy is exhausting them every day.”



# Estonia calls on NATO for stronger defence of its Baltic members

## Key: STRONGER DEFENCE AND DETERRENCE

<b>40,000</b> TROOPS UNDER DIRECT NATO COMMAND	<b>130</b> ALLIED AIRCRAFT AT HIGH ALERT
<b>100,000</b> US TROOPS DEPLOYED TO EUROPE	<b>140</b> ALLIED SHIPS AT SEA



NORWAY

**EXERCISE COLD RESPONSE**  
OVER **30,000** TROOPS FROM 27 COUNTRIES

**AIR POWER**  
ALLIED TROOPS **4,000**  
HOST NATION **16,800**

**AIR POWER**  
ALLIED TROOPS **2,000**  
HOST NATION **7,000**

**AIR POWER**  
ALLIED TROOPS **1,700**  
HOST NATION **7,400**

ESTONIA  
LATVIA  
LITHUANIA

**AIR DEFENCE**  
ALLIED TROOPS **10,500**  
HOST NATION **120,000**

POLAND

& SURVEILLANCE

**AIR DEFENCE**  
ALLIED TROOPS **2,100**  
HOST NATION **13,000**

SLOVAKIA

HUNGARY

**ALLIED TROOPS**  
**3,300**  
**HOST NATION**  
**76,000**

ROMANIA

BULGARIA

**ALLIED TROOPS**  
**900**  
**HOST NATION**  
**26,000**

21. We will significantly strengthen our deterrence and defence posture to deny any potential adversary any possible opportunities for aggression.

To that end, we will ensure a substantial and persistent presence on land, at sea, and in the air, including through strengthened integrated air and missile defence.

We will deter and defend forward with robust in-place, multi-domain, combat-ready forces, enhanced command and control arrangements, prepositioned ammunition and equipment and improved capacity and infrastructure to rapidly reinforce any Ally, including at short or no notice.

We will adjust the balance between in-place forces and reinforcement to strengthen deterrence and the Alliance's ability to defend.

Commensurate with the threats we face, we will ensure our deterrence and defence posture remains credible, flexible, tailored and sustainable



# Strategic/Theater Wide perspective

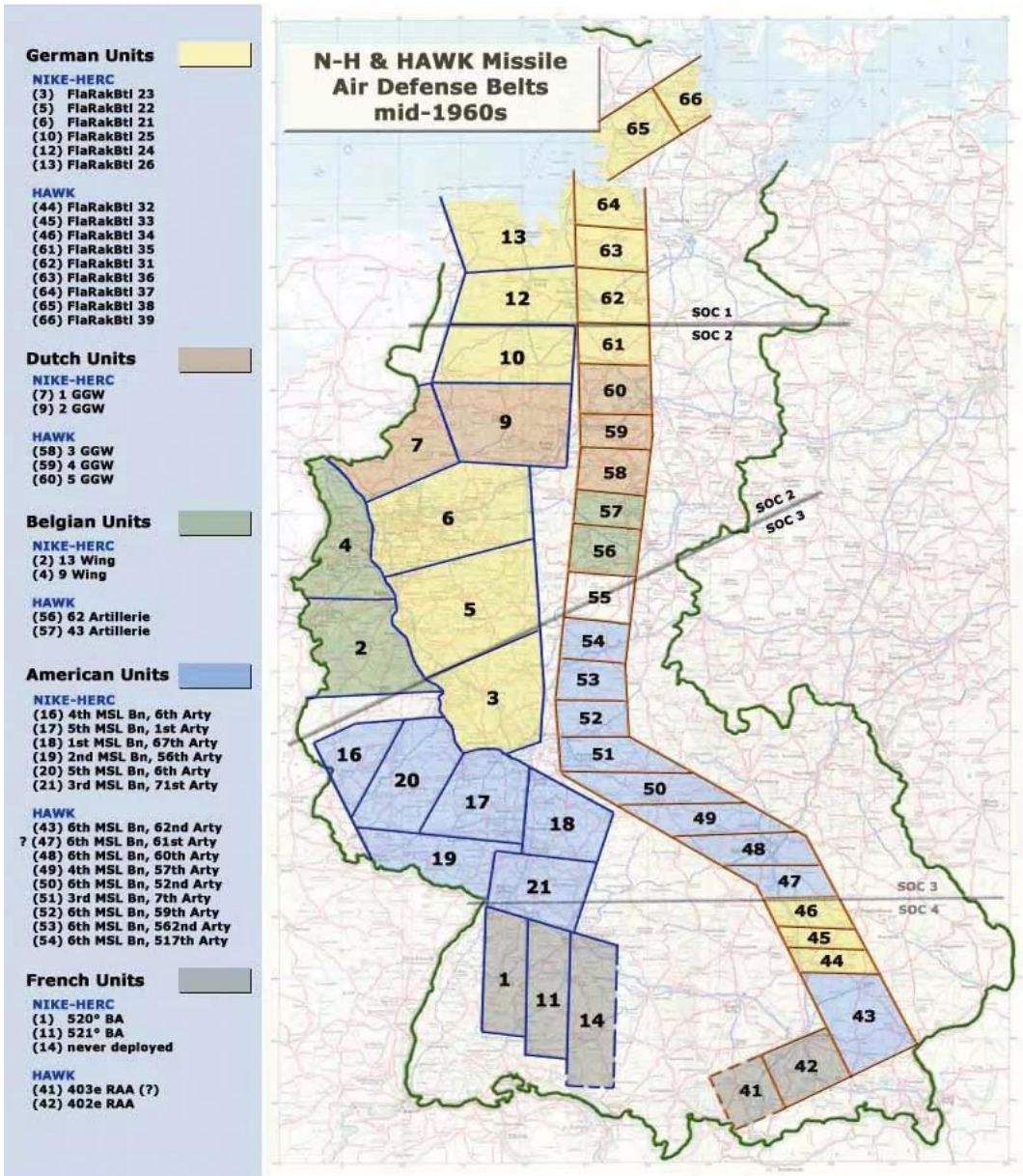
SOVIET FORCES and NATO  
in Central Europe



NATO Central and Northern Region. Airpower in Place  
1,340 Fighter/Strike  
445 Interceptor  
200 Recce





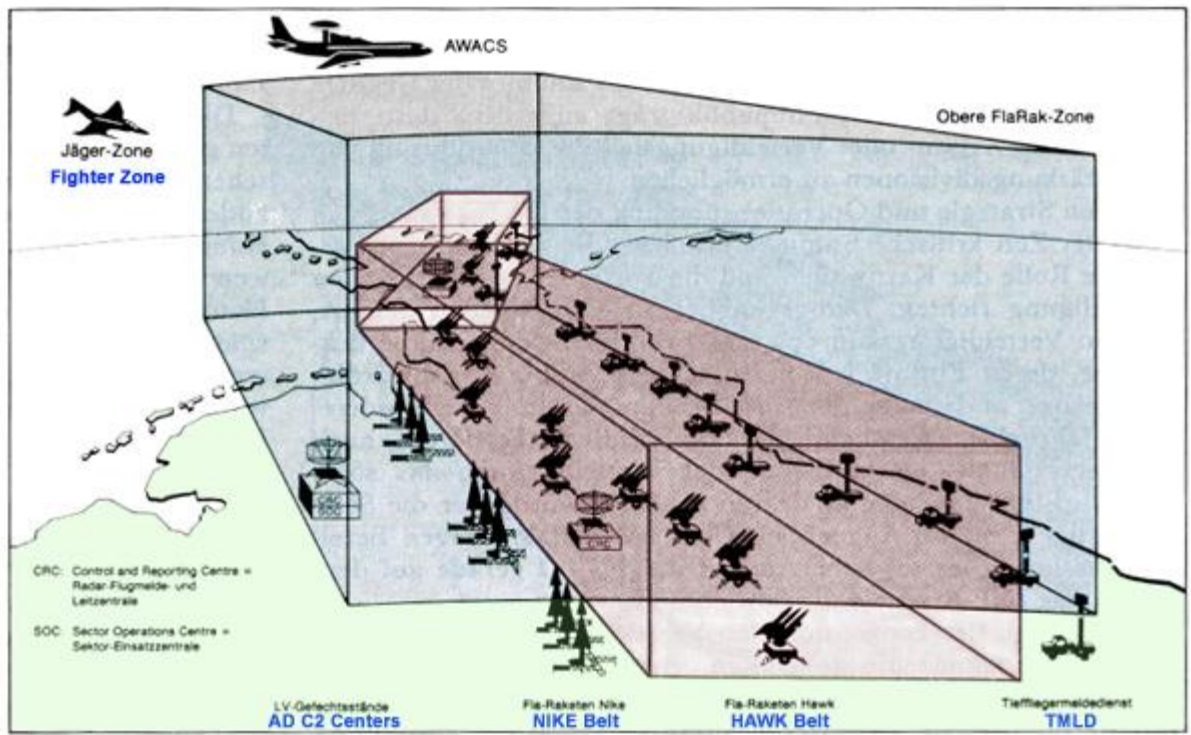


1967 MC 14/3 Flexible response

- New emphasis on conventional forces

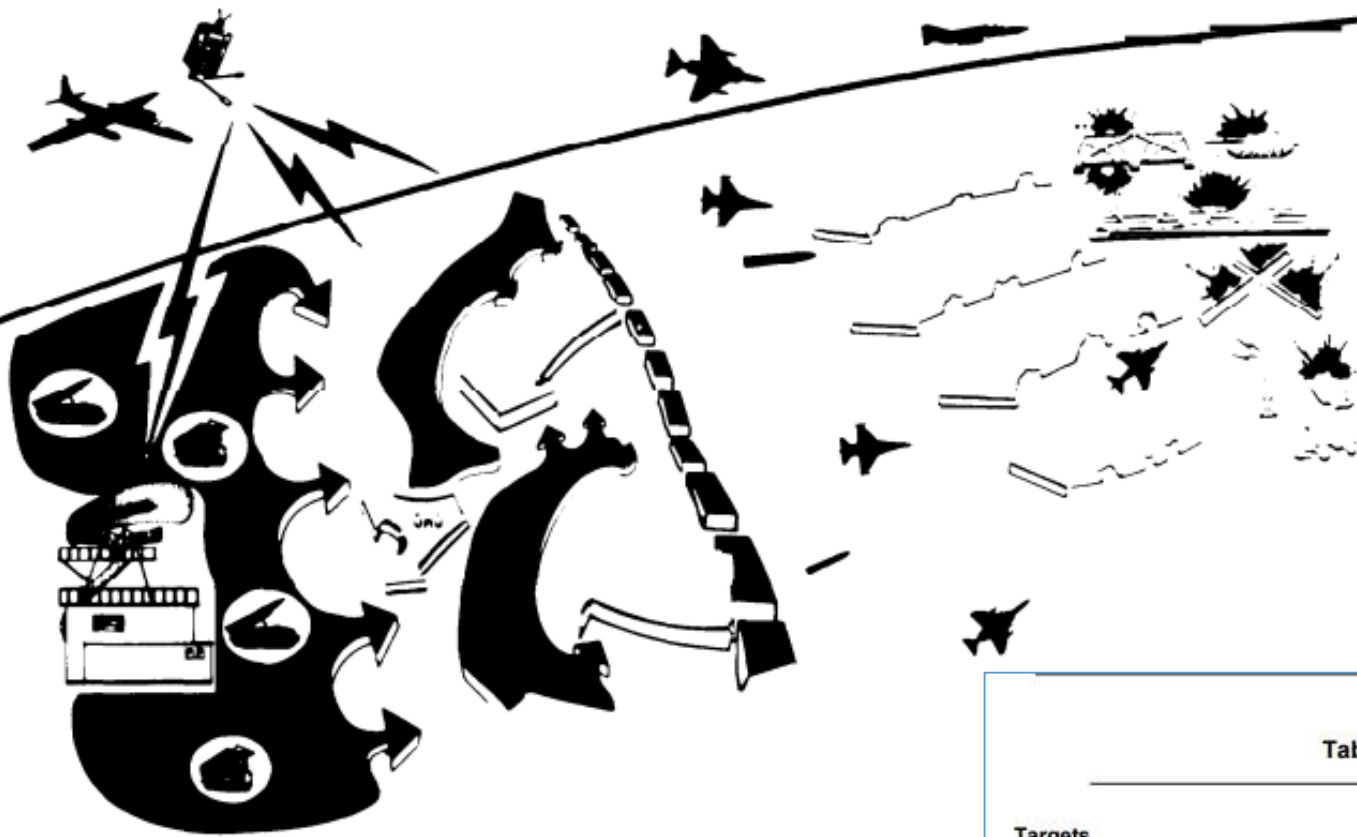
**Air strategy tasks:**

1. Secure initial deployments from air attacks
2. Protect ports
3. Preserve freedom of maneuver for ground forces:



Das Luftverteidigungssystem der NATO

Figure 2-3.— FOFA Reduces Advancing Forces



SOURCE SHAPE

### FOFA concept

- Deep strikes Tornado, F-111
- COMAO packages: Recce, AI & OCA
- Embedded SEAD/DEAD/EW/SWEEP
- BAI, CAS
- MLRS
- JSTARS & AWACS
- Corps/Div Air Liasons

Table 6-1: Summary of Targets and Objectives for FOFA<sup>a</sup>

Targets	Range (kilometers beyond FLOT)				
	5 to 30	30 to 80	80 to 150	150 to 350	350 to 800
Moving columns .....	1	1	2		
Units in assembly areas .....	1	1	2		
Command posts .....		2	2		
Chokepoints and halted units .....			2	2	
Units transported on roads .....				2	
Units in off-loading areas .....				2	
Units transported on rails .....					3
Rail network .....					3
Levels of damage <sup>b</sup>	1 "Destroy"				
	2 "Disrupt"				
	3 "Delay"				

<sup>a</sup>This choice of objectives for FOFA operations is based on information received from SHAPE, USA Army, and USAir Force sources, as discussed in ch 5. This choice of targets and objectives is for OTA analysis only, and is not intended to be exhaustive or definitive.

<sup>b</sup>See ch 5 for discussion of desired levels of damage.

SOURCE Office of Technology Assessment, 1987



U.S. AIR FORCE

JAOC

ATO/ACO



BDZ



AWACS

MEZ

RAPCON

FSCL

FAC (A)



CMCP  
ASOC



CRC



CRC

XX

X

MRR3

TR3

R32

R33

MEZ

PAA



WFZ

37

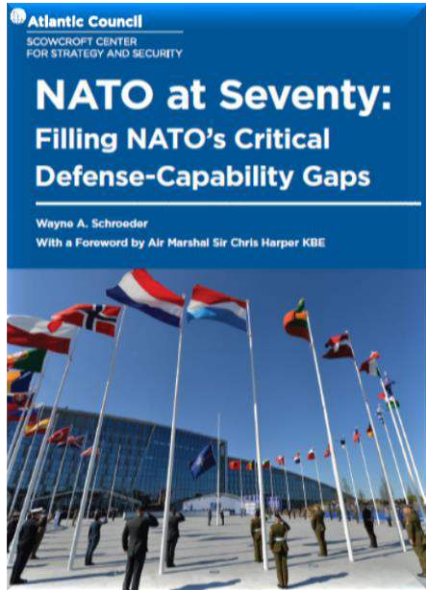
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Integrity - Service - Excellence

### PROCEDURAL CONTROL

Relies on previously agreed to and distributed airspace control measures such as:

- Comprehensive air defense identification procedures and rules of engagement
- Low level transit routes
- Minimum risk routes
- Aircraft identification maneuvers
- Fire support coordinating measures
- Coordinating altitudes
- Restricted operations zone/ restrictive fire area
- Standard use Army aircraft flight route
- High-density airspace control zone



## Air & MSL Def critical for deterrence credibility

- invest in conventional **deterrence by denial** capabilities to close the tactical-nuclear gap and to prevent the re-nuclearization of European security
- **address critical capability shortfalls in A2/AD**
  - stand-off munitions,
  - counter A2/AD: SEAD, DEAD,
  - Enhanced GBAD, TBMD, counter drone
  - EW
  - Modernized (& hardened) C4ISR.
  - 5th Generation combat aircraft
- **Exploit Western asymmetric edge to avoid attritional confrontation: sea & air power**

